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**DEFENSE
AGAINST**

RADIOACTIVE FALLOUT

ON THE FARM

FARMERS' BULLETIN NO. 2107

U. S. DEPARTMENT OF AGRICULTURE

PROTECT YOURSELF AND FAMILY FIRST

If we were attacked with nuclear weapons, you, the American farmer, would be depended on to supply the food and fiber needed to keep the economy going. One of the problems you might face is radioactive fallout.

In the event of enemy attack, first provide for your own safety and that of your family and neighbors. Then take care of your livestock, your crops, and your land.

Your best protection from fallout is a specially constructed shelter or a protection area in an existing building. If fallout occurs and you have not yet built a shelter, go to the safest place you have—such as a cyclone cellar, a root cellar, or a corner of your basement. To increase the protection of your basement, shield doors and windows with concrete blocks, bricks, or sandbags. If you do not have an underground refuge, at least *stay indoors*.

Designs of five types of inexpensive family fallout shelters—one of them a “do-it-yourself” type—are presented in a publication on family fallout shelters, available from your local civil defense office or the Office of Civil Defense, Washington, D.C., 20310.

Local civil defense authorities will make every effort to let you know when it is safe to come out of shelter. Emergency information will be disseminated to the public in every possible way, including radio and television.

The recommendations in this bulletin are those of scientists, engineers, public health officials, civil defense authorities, and other specialists. Study of the effect of radioactive fallout on agriculture is a continuing project. Some of the recommendations in this bulletin may have to be changed in the light of future research.

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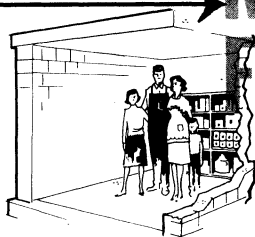
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This bulletin was prepared by the Agricultural Research Service, U.S. Department of Agriculture, in cooperation with the Atomic Energy Commission, the Office of Civil Defense, and the U.S. Public Health Service.

Washington, D.C.

Revised November 1965

DEFENSE AGAINST RADIOACTIVE FALLOUT ON THE FARM



BACKGROUND INFORMATION

Most Americans know about the destructive power of nuclear weapons. The explosive power of the atomic bombs used in World War II was equivalent to about 20,000 tons of TNT. Since then, bombs have been developed that have explosive power equivalent to millions of tons of TNT.

An enemy attack with a nuclear weapon could cause radioactive contamination many miles downwind from the target area. Radioactive material produced by the bomb would give off destructive rays and particles that could injure—or kill—human beings and animals, and could make farmlands and crops dangerous to use. This material, when it falls to the earth, is called radioactive fallout.

Fallout could settle anywhere—even in the most remote parts of the country. If large industrial centers or missile sites were bombed with nuclear weapons, it is likely that small towns and rural areas in the downwind path would be endangered.

If a massive nuclear attack were to occur, a high percentage of our farmland could receive *early* fallout. Early fallout consists of heavy particles that are deposited within 24 hours after a nuclear explosion and usually within a few hundred miles from the explosion; the extent of its spread depends on the winds. Any part of the country could receive varying amounts of *de-*

layed fallout. Delayed fallout is far less serious than early fallout in that it is not a threat to national survival and shelters are not required because of it. Delayed fallout consists of the smaller particles that remain suspended in the upper atmosphere for months or even years and are carried by high-altitude winds to all parts of the earth.

After nuclear attack, fallout, if significant, would be visible, especially on polished or smooth surfaces, but the radiation from its active elements could be detected accurately only by special instruments. Because of this, your Government is preparing means of warning you if your land and home lie within the path of harmful radioactive contamination.

You can defend yourself against fallout—on your farm and in your home. The following questions and answers will help you to understand the nature of fallout, and, in the event of enemy attack, will help you to protect yourself from it.

What is radioactivity?

It is a process whereby radioactive elements disintegrate and, in so doing, release powerful electromagnetic rays like X-rays, or eject small, invisible particles of matter.

Radiation is nothing new. All living things are constantly exposed to

small amounts of radiation. We breathe and eat radioactive materials that occur naturally in the soil, water and air. We also are exposed to radiation when we have X-ray examinations. But explosions of nuclear bombs produce large amounts of radioactive elements that can affect the health of human beings and animals.

What happens when a nuclear bomb explodes?

The explosion produces *blast, heat, initial radiation, and residual radiation*. The first three occur almost instantaneously with the explosion, and are destructive in the target area and for some miles around. The fourth—residual radiation, which comes mostly from fallout—has a delayed and longer effect, and may be dangerous over a much larger area.

What is fallout?

Fallout is radioactive material produced by a nuclear explosion; this material falls to earth from the upper air. When a bomb explodes *close to the earth*, large quantities of pulverized soil are drawn up into the ascending cloud and may be carried to heights of 15 miles or more. After mixing with the highly radioactive residue material of the bomb, the finely divided soil falls back to earth and produces radioactive contamination.

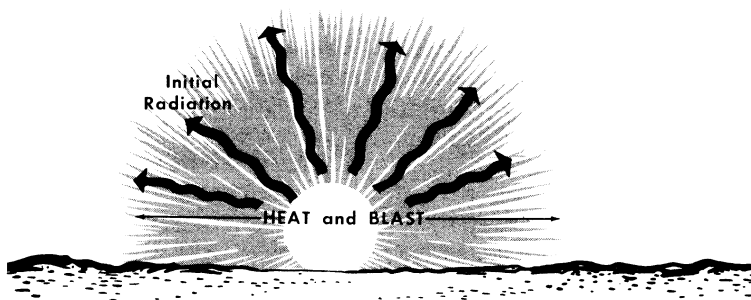
Large particles of this material fall close to the point of the explosion. Small particles fall more slowly, and winds carry them farther as they descend. Significant amounts of fallout do not arrive outside the blast area earlier than about one-half hour after an explosion. Fallout of major concern will have been deposited within 1 day after the explosion and may extend several hundred miles downwind. It may eventually blanket thousands of square miles if the bomb was large and the winds are strong.

Why is fallout dangerous?

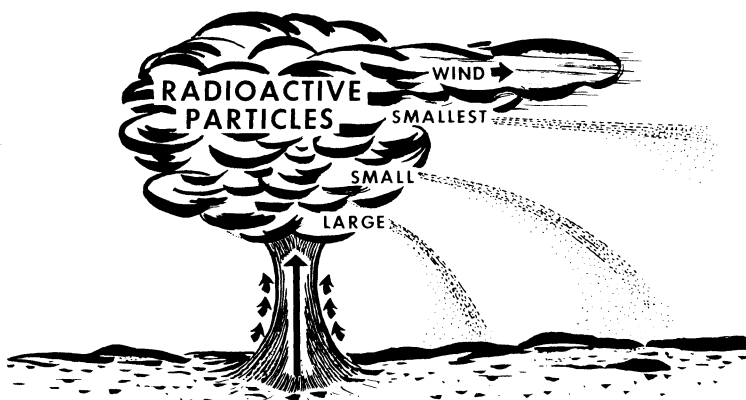
If an area is highly contaminated by fallout, radiation may be a threat to human beings, animals, and crops. Fallout can contaminate food, water, buildings, yards, and fields, and make them unsafe to use for varying periods of time. Generally, food and water are not difficult to decontaminate, nor are buildings or paved areas. Yards and fields may be very difficult.

Some of the rays can penetrate the body and cause serious internal damage. Other rays cannot penetrate deeply, but can cause skin damage similar to a deep burn if, in the early period after detonation, radioactive fallout is deposited in significant amounts on the bare skin and allowed to remain there.

All radioactive chemical elements



A nuclear explosion produces blast, heat, and initial and residual radiation; residual radiation comes mostly from fallout.



Large quantities of pulverized soil are drawn up into the ascending cloud and may be carried to heights of 15 miles or more.

(radioisotopes) in fallout, especially radioactive strontium and radioactive iodine, will cause internal radiation damage if taken into the body in sufficiently large quantities. This hazard is not comparable to the hazard from external exposure. Effects of internal radiation damage probably would not be observed until long after exposure. For this and other reasons, the danger from internal radiation is considered to be less serious than from external radiation. Also, internal exposure may be prevented.

To understand the nature of fallout, you need to know that fallout contains a mixture of long-lived and short-lived radioactive materials, each of which loses activity, or decays, at a specific rate. Scientists usually express the decay rate in terms of the half-life of the material. The half-life is the time required for the radioactivity of a material to reduce to one-half its initial value.

Strontium 90 is among the most important of the long-lived group. Iodine 131 is an example of an important, relatively short-lived radioisotope.

Chemically, strontium is similar to calcium. For example, after it enters the body of a dairy cow, a small part is secreted in milk, a small part goes

into the muscles, but most collects in the bones. Strontium 90 has a half-life of about 28 years—it continues to lose one-half of its remaining radioactivity during each 28-year period that passes—and sufficient amounts of it in bone can cause bone cancer. As mentioned earlier, however, this is less of a problem than the danger from external exposure.

Iodine 131 has a half-life of about 8 days, and therefore is dangerous for a much shorter time than radioactive strontium. After entering the body, some radioactive iodine collects in the thyroid gland. If too much of it is present in the body, it will damage the thyroid cells. This is more serious for young children, especially babies, since their thyroid glands are small and therefore a greater percentage of the cells would be damaged. Radioactive iodine is secreted in the milk of cattle; it thus is a particular threat to young children drinking milk from *cows grazing on contaminated pasture* during the first few weeks following a nuclear attack.

What determines the size of the fallout area?

Fallout can be a serious hazard to communities that are many miles be-

yond the area affected by the explosion. During a 1954 test at the Eniwetok Proving Grounds in the Pacific, the area of heavy fallout extended about 140 miles downwind from the point of explosion, and was up to 20 miles wide.

The extent and location of a fallout area are determined by—

- Size of the fallout particles.
- Power and design of the bomb.
- Altitude of the bomb burst.
- Atmospheric conditions—including precipitation and direction and speed of winds from the surface up to about 80,000 feet.

Because of the variety of factors, fallout hazard cannot be estimated accurately in advance. However, the area of probable fallout and the speed with which fallout will arrive can be estimated. Data for preparing these forecasts are released twice daily by the U.S. Weather Bureau and are available to civil defense authorities.

After a bomb is exploded close to the ground, a large radioactive cloud rises to a high level in the atmosphere. Some particles are blown downwind and crosswind, in the area of the target. Strong winds may spread fallout over long distances downwind.

How long is fallout dangerous?

The greatest hazard from radiation exists during the first few days following heavy deposit of fallout. The hazard decreases with the passage of time, as radioactivity of materials decays and intensity of radiation decreases.

Particles reaching the ground soon after the burst are highly radioactive, while those that remain in the air for longer periods lose much of their radioactivity before they settle to earth.

The total radiation hazard of newly formed (fresh) fallout decreases rapidly at first because this fallout contains many radioisotopes that have short half-lives. The radiation hazard decreases less rapidly after the shorter-

lived elements have lost most of their radioactivity.

The radiation level from any radioactive material reduces with time. How fast this reduction is depends on design of the bomb that produced the fallout, altitude of detonation, type of material in the environment at the place of detonation, and whether fallout was from two or more bombs detonated some time apart. None of these things can be known accurately in advance. However, the rate of radiation reduction may be approximated by use of the 7:10 rule of thumb: Each 7-fold increase in time after detonation, gives a 10-fold reduction in radiation level.

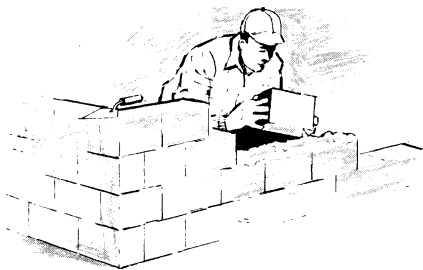
You must keep in mind that this rule does not refer to intensity of radiation at a particular place unless the radioactive material has been undisturbed during the time being considered. The 7:10 rule of thumb must not be applied in a particular place until all fallout has settled. For example, fallout deposition that began at 3 hours after detonation might not be completed until 3 hours later, so the rule should not be used until 6 hours after detonation.

How can I protect my family and myself from radiation?

You can limit exposure by staying in an adequate shelter. Three or more feet of packed earth or concrete provide excellent shielding from radiation. An ordinary frame house will give some protection—a masonry house even more. Appreciable protection would be provided in a basement below ground level. For assurance of adequate protection, however, a specially prepared fallout shelter is required.

How will I know if fallout is coming?

Certain radio stations have been authorized to operate during a national emergency. If an enemy attacks, these



To protect your family, build a fallout shelter.

stations will broadcast official information and instructions. Local or county civil defense officials can tell you what stations in your area have been authorized to make emergency broadcasts. If you are not within range of a station authorized to make such broadcasts, follow whatever preattack in-

structions you receive from your local, county, or State officials.

If a nuclear bomb detonates within a hundred miles or so, you will probably see the flash or hear the blast.

Later, you will receive instructions from local civil defense authorities. You should not wait for such reports before taking protective action. They probably would not arrive in time. Later, the monitors will determine the level of the fallout hazard and indicate what further precautions, if any, should be taken. (See p. 12 for facts about monitoring service.)

Radiation can be detected and measured only with proper instruments. However, after nuclear attack, dust clouds or unusual dust concentrations in the atmosphere should be assumed to be radioactive.

PROTECTING LIVESTOCK

How will fallout affect unprotected livestock—that is, animals in fields, pastures, and other open areas?

Fallout may be dangerous to cattle, sheep, horses, pigs, and other livestock as well as to human beings. Radioactive materials in fresh fallout can contaminate the immediate environment and give off rays that can penetrate deep into the body. This is the major source of danger for livestock. Animals can also suffer skin burns if fallout settles in the coat. Skin burns could produce considerable discomfort, but would not endanger the lives of the animals.

Animals are about as sensitive to radiation damage as human beings; to survive, animals need the same protection as human beings.

When livestock must graze on fallout-contaminated pasture, supplemental feeding from noncontaminated forage can materially reduce the daily dose of radioactive material the ani-

mals will eat. Stored or stacked hay, ensilage from either silo or trench, and stored grain are safe supplemental feeds when they are protected from fallout contamination. When no shelter is available and when the level of radiation is only moderate, or food resources are scant, growers should, if possible, supply supplemental feeding and limit the grazing time.

When meat and dairy animals eat contaminated feed, some radioactive elements are absorbed into their bodies. Thus, man's food supply of animal products can become contaminated with radioactivity.

How will fallout affect sheltered livestock?

Livestock housed in barns and other farm buildings during fallout have a better chance of surviving effects of radiation than those that are not sheltered. A reasonably well-built shelter reduces intensity of external radiation and prevents fallout from settling on

the animals' bodies. It also prevents animals from eating contaminated feed.

What is the best way to protect livestock from fallout?

Move them indoors as soon as possible. If you do not have adequate facilities to house all animals, put some of them near farm buildings or in a small dry lot. Under these conditions the amount of space per animal in a barn should be reduced to the point of overcrowding. The limiting factor is ventilation and not space. The advantage is that the animals tend to shield each other enough that more will survive under crowded conditions than under normal housing. Large, protected self-feeders and automatic livestock waterers can supply uncontaminated feed and water.

Areas within movable fences, and other small fenced areas that have covered feeders or self-feeders, can provide emergency confinement for farm animals after early external radiation intensity has decreased through decay.

Empty trench silos can be converted to livestock shelters by constructing a roof over the trench and covering it with earth.

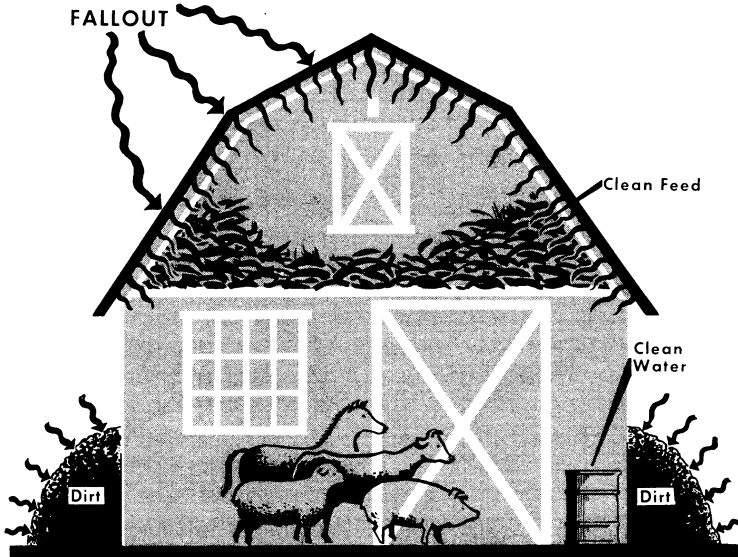
Once fallout occurs, you should not attempt to protect livestock unless local civil defense authorities tell you that you will be safe when doing so.

Get your dairy cattle under cover first. (See p. 7.)

What water can I give livestock after fallout?

Water from a covered well, tank, or cistern, or from a freely running spring, is best. River water or pond water is less safe, but if necessary it could be used after fallout has occurred. In a few days it would be safe. If, however, it should rain during this time, livestock should not be permitted access to pond water for an additional few days.

Usually, fallout particles would settle promptly and soluble radioactive materials would diffuse in the water, reducing the contamination at the surface. If the water was constantly replenished from an uncontaminated



Livestock housed in barns during fallout have a better chance of surviving effects of radiation than those that are not sheltered.

source, radioactivity would be diluted rapidly.

To prevent contamination from fallout, do not add water to covered tanks unless the water is from a protected well or spring; first use the water originally present in the tanks.

Could I use water in an exposed pond?

Water in an exposed pond would be contaminated, but usually the level of contamination would decrease rapidly. Such water could be used for surface irrigation. It could also be used to wash off farm buildings and unsheltered livestock. Obtain drinking water for livestock from another source if possible.

What feed can I give livestock after fallout?

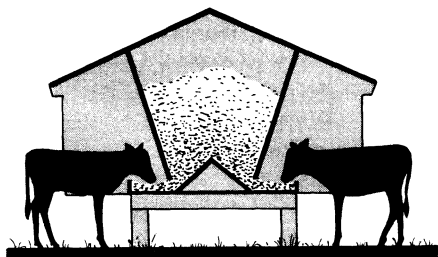
To protect feed adequately, cover it. Fallout is like dust or dirt; a cover will prevent it from coming in contact or mixing with the feed.

Grain stored in a permanent bin, hay in a barn, and ensilage in a covered silo are adequately protected. They can be used as soon as it is safe to get to them following fallout.

A haystack in an open field can be protected with a tarpaulin or similar covering.

If possible, give your livestock feed that does not contain fallout material. Fallout particles that settle on hay, silage, or a stack of feedbags will contaminate only the outer parts. You can remove the outer layers or bags, and use the inside feed that is unaffected.

You will be notified if local civil defense and agricultural authorities who measure concentrations of fallout consider the forage growing in your area is harmful. However, this advice might come too late in heavily contaminated areas. As a precautionary measure, house the livestock and do not let them graze.



You may have to give cows contaminated feed if no other feed is available. The milk from these cows should not be used by children, but when the cows are back on clean feed, the amount of radioactive material in their milk will progressively diminish.

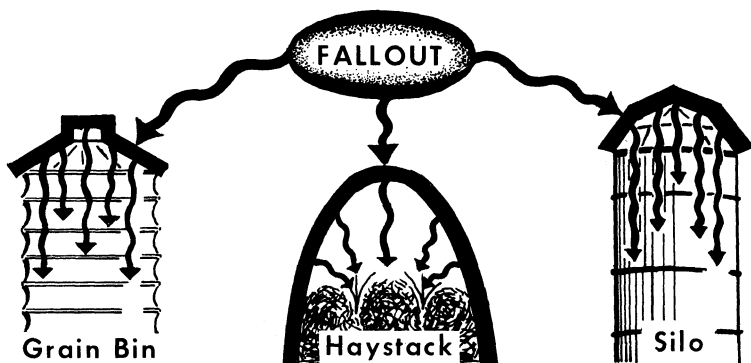
What can I do with contaminated feed?

How long feed should be stored depends on the type and concentration of the radioactive materials. If you have an alternate supply, do not use contaminated feed until told by authorities that it is safe to do so; then be sure to follow the precautions they may recommend.

Should dairy cows receive special treatment?

Yes. Because radioactive materials can be transferred to milk, which will be a critical product during an emergency, make a special effort to protect cows from fallout. Remove milking cows from pasture and feed them stored rations during the period of fresh fallout and for several weeks after. In this way, you will prevent iodine 131 from occurring in the milk, or reduce it to insignificant levels.

Give cows preferred shelter and clean feed and water. If you can, milk them before fallout occurs; you may not be able to do so for several days afterward. If you have calves on the farm turn them in with the cows. This will help prevent mastitis and conserve all the feed for the cows. Reduce



Cover—a permanent bin, covered silo, or even a tarpaulin—will prevent fallout from coming in contact or mixing with the feed.

amounts of water and concentrated feed to maintenance levels.

Construction plans are available through State extension agricultural engineers for a combination dairy barn and family fallout shelter. Although construction of this type is costly, such a facility might be considered for the protection of highly valued breeding stock.

The plans are designed in accordance with milk production ordinances. They provide for (1) a year-round production unit that requires minimum change for emergency use, (2) a built-in family fallout protection area that allows the operator to care for animals during a fallout emergency, (3) all stored feed that is manually accessible to be inside the barn, (4) stored hay and straw for use as shielding, (5) temporary housing, feed, and water for other livestock, (6) an auxiliary generator for assuring electric power, and (7) a water supply inside the barn.

What measures should be taken to protect poultry?

Measures for protecting poultry are the same as those recommended for other farm animals.

Poultry are somewhat more resistant to radiation than other farm animals. Since most poultry are raised under

shelter and given feed that has been protected or stored, and since poultry can be grown rapidly, they are one of the more dependable sources of fresh foods of animal origin that may be available following a nuclear attack.

Hens that eat contaminated feed will produce eggs that contain some radioactive elements. Radioactivity in eggs decreases shortly after the hens are removed from the contaminated environment and given uncontaminated feed and water.

What animal food products are safe to market after fallout?

You will receive specific instructions from local civil defense authorities based on amount of fallout received. *Do not destroy any animal food products unless spoilage has made them inedible.* Milk should be safe to use if it is from cows that are adequately sheltered and protected and are fed rations of stored and protected feed and water. Milk from a fallout area where cows are not adequately protected or fed stored feed should not be given to children until civil defense authorities approve. Milk contaminated with iodine 131 can be processed into butter, cheese, and powdered or canned milk, and stored for a period of time to allow the radioactivity to decay.

Food animals whose bodies have been exposed to external radiation can be used for food if they are slaughtered before the onset of signs of radiation sickness. Also, they can be used after they have recovered from the ensuing illness. The same rules that govern the slaughter of animals sick from any cause should be followed. Care must be taken to prevent edible parts of the carcass from being contaminated by radioactive materials contained on the hide and in the digestive system.

What do I do if animals die from fallout radiation?

Some of your animals may be affected so severely by radiation from fresh fallout that they will die in a few days or weeks after being exposed. *Do not slaughter any of your livestock unless you are told to do so by local civil defense authorities or USDA county defense boards.* (For a description of the functions of the USDA county defense boards, see p. 11.)

Bury animals that die. These carcasses usually are not dangerous to surviving people or animals by the time it is safe to work outside.

Is it possible to decontaminate livestock and farm buildings that have been exposed to fallout?

If there is fallout on the animals' skins, the radioactive material can be washed off with water. It is not necessary to use clean water sources for this purpose. Take care to avoid contamination runoff.

Civil defense authorities or USDA county defense boards may advise you on decontamination procedures for your farm buildings.

In handling animals, wear coveralls, gloves, and boots to prevent contaminating yourself. Cleaning or disinfecting buildings will not destroy radioactivity. However, cleaning can be useful in moving radioactive materials to a place where radiation will be less harmful. In cleaning, be careful to avoid contaminating yourself.

PROTECTING LAND AND CROPS

What are the main consequences of heavy concentration of fallout on crop and pasture lands?

- Farm workers may not be able to manage and cultivate land safely for some time, because of radiation hazard.
- It may not be advisable to permit animals to graze, because of the danger of radiation.
- Fresh fallout would provide surface contamination on all plants, resulting in potential hazard to human beings and animals consuming them.
- Radiation from fallout deposited on the leaves or the ground may damage the crop.

How long would fallout affect cultivated and noncultivated lands?

It would depend on the abundance

and type of radioactive materials in a given area.

In the event of nuclear attack, radioactive iodine would be the most critical single factor in the contamination of milk during the first few weeks. After the first 60 days, the principal hazard would arise from strontium 89 and strontium 90. Strontium 89, however, will have virtually disappeared 17 months after its formation.

Like other radioactive isotopes of fallout, strontium 90 falls on the surface of plants and can be consumed with foods and forage. Some of it is deposited directly on the soil or washed into it, remaining indefinitely—for all practical purposes—in the top several inches of uncultivated land.

Because it is chemically similar to

calcium, radioactive strontium would be absorbed by all plants. Plants growing in soils deficient in calcium would absorb more radioactive strontium than those growing in soils abundant in calcium, other conditions being equal.

Are there soil treatments for reducing the fallout hazard on land?

Yes, but soil treatments should be given only after responsible authorities have carefully evaluated the situation and declared a state of emergency. The most effective treatment could be costly, and suitable only for intensively used land.

Other methods involve changes in generally accepted farm practices. Some measures could be simply an improvement over local conditions and procedures. For example, liming of acid soils could reduce the uptake of radioactive strontium in crops grown on those soils.

USDA soil scientists in the USDA county defense boards will provide guidance to farmers in determining best utilization of their land following nuclear attack.

Any use of the land must wait until external radiation levels are low enough for persons to work safely outdoors.

Would fallout permanently affect pasture grass and forage crops?

If fallout is extremely light, the pasture would be usable immediately. It is difficult to set an exact external dose rate at which it would be safe to return the animals to pasture, but if the dose for the first week of stay did not exceed 25 roentgens all animals would survive and could be handled with safety.

If fallout is heavy, external radiation would prohibit use of the pasture. A heavy deposit of fallout would spread short-lived and long-lived radioactive particles on the pasture and forage

crops. Radiation might cause visible injury to plants. Some plants might die.

Existing growths of alfalfa and other forage crops might not be usable because of radiation hazard. If a radiation survey should indicate that contamination level is high, existing growth should be removed as close to the ground as possible and discarded; succeeding growths should be used only after examination for radioactivity. If the soil is acid, a top-dressing of lime would help reduce uptake of radioactive strontium in succeeding growths.

Livestock could be allowed to graze on lightly contaminated pasture after a waiting period that varies from one to a few weeks, the length of time depending on the degree of contamination.

Once it is safe to work the land, a periodic check on pasture and produce in affected areas would provide the best safety guide to their use.

Would fallout affect my system of farming?

It could. Seriously contaminated land may need to lie fallow for as long as a season. After this, fallout may require a change to nonfood crops or to food crops that do not absorb large amounts of radioactive materials from the soil. Alfalfa, clover, soybeans, and leafy vegetables have a greater tendency to absorb long-lived radioactive strontium than cereal grains, grasses, corn, potatoes, and fruits. Guidance on suggested crops to plant will come from USDA county defense boards.

Would fallout reduce economic productivity of crop and pasture lands?

Fallout might reduce such productivity in several ways: (1) Crop and soil management could be impeded because of danger from external radiation; (2) some crops might be killed

by contamination; (3) other crops might become contaminated to a degree where they would be unmarketable; and (4) economic value of food grown on contaminated land might be less than that of other competitive crops.

What are the effects of fallout on growing vegetables?

Growing vegetables that are exposed to heavy fallout may become highly contaminated. Leaves, pods, and fruits that retain fallout material should be cleaned before being eaten. Washing is probably the most effective measure, just as it is the best way to clean garden foods that get dirty from any other cause. Radiation from heavy fallout may affect plant growth.

Roots and tubers absorb little contamination from fallout before it is mixed with the soil. The normal cleaning or peeling of underground vegetables such as potatoes or carrots would be adequate for removing fallout.

What are the effects of fallout on fruits?

If fallout is heavy, ripe fruits may be lost because of the personal hazard involved in harvesting them. Fruits that do not have to be picked immediately can be saved. They should be washed before they are eaten.

Would fallout limit use of plants for human food?

It depends on the extent of radioactivity.

Leafy vegetables, such as lettuce, should not be eaten unless they are thoroughly washed, or are known to be free of hazardous amounts of radioactive materials.

What special precautions should be taken for workers in the fields?

You should remain indoors until danger from fallout has diminished and you have learned from local officials that it is all right to work outdoors.

EMERGENCY DEFENSE SERVICES

By order of the President, the Secretary of Agriculture has put into effect defense services to protect farmers, their families, their livestock, and their agricultural productivity in event of a

national emergency. The wide scope of these services enables them to function at all levels—national, State, county, and farm.

County Defense Boards

In preparing for a national emergency, the farmer may obtain guidance and assistance from his USDA county defense board. More than 3,000 of these boards are operating throughout the Nation. The USDA county defense boards receive direction from USDA State defense boards.

A USDA county defense board is composed of key USDA representatives in the county. The county office manager of the Agricultural Stabilization and Conservation Service usually

serves as chairman. Other board members may include representatives of the Cooperative Extension Service, the Farmers Home Administration, and the Soil Conservation Service. Representatives of the Forest Service, the Agricultural Research Service, and the Consumer and Marketing Service, where available, are also members of the board.

Each USDA county defense board is equipped to serve the farmer in many ways. In most counties, the

board chairman is responsible for food production programs. He will see that guidance is available in emergency farming practices and in conserving farm equipment, fuel, and manpower; he also will help obtain essential services or material.

The Soil Conservation Service member of the board will advise and assist in the proper use of land and water; and the Farmers Home Administration member will help the farmer in credit problems that may arise. The county extension agent will provide education on survival practices and protective measures for the farmer, his family, and his livestock.

The board chairman, or one of the

board members, will advise farmers regarding *other programs of USDA agencies that are not represented on the board*. This might include, for example, assistance in protection of livestock and crops against the spread of disease or rural fire defense. Generally, the board chairman is responsible for USDA programs relating to food processing, storage, and distribution.

USDA county defense boards will work closely with and support county authorities. Farmers can look to their local county civil defense officials as well as USDA county defense boards for guidance in national emergency programs.

Radiological Monitoring

Radiological monitoring is measurement of the levels of exposure by radiation present in nuclear fallout. Special instruments and people trained in their use are required for this work.

Monitoring services would be needed in the early period following a nuclear attack to determine intensity of radiation on the farm. If this intensity were high, monitoring services would be needed later to determine when farming activities should be resumed. Examples of this monitoring service are detection and measurement of radiological contamination of farmlands, harvestable crops, forest land, and water and protection and handling of farm animals.

State and local governments are responsible for establishing comprehensive radiological monitoring systems in inhabited and habitable areas to measure and report radiation intensities. This monitoring provides the basis for survival and recovery. USDA is directly responsible for certain specialized monitoring—

- At major meat and poultry inspection installations.

- Of forest lands, agricultural lands, and water.

- Of federally owned stored food.

One or more USDA monitoring stations are established in each county in the United States. They provide capability to perform monitoring assigned to USDA, and they will also supply part of the radiological information needed for planning and directing local survival and recovery operations.

Office of Civil Defense guidance and the USDA Radiological Monitoring Handbook provide details for the necessary coordinated effort at the county level. Simply stated, county civil defense and the USDA county defense boards are responsible for joint planning and postattack advice to the farm population on precautions to take to minimize radiation exposures associated with farm work; county civil defense is responsible for most of the monitoring, reporting, and analysis of the data; and the USDA county defense board applies USDA guidance adjusted to local conditions in recommending appropriate—

- Care or disposition of livestock.
- Use of agricultural lands and water.
- Use or disposition of agricultural commodities.

If you have a question about the detection of harmful radiation, you should contact your local civil defense official or the chairman of your USDA county defense board.

Rural Fire Defense

Disastrous fires could follow a nuclear attack. To fight them effectively, a civilian rural fire defense has been established under the overall leadership of the U.S. Department of Agriculture, through its Forest Service. This agency is responsible for pre-emergency and emergency operations covering:

1. Prevention and control of fires in rural areas caused by effects of enemy attack (in cooperation with State Government and appropriate Federal agencies).

2. Determining damage to National Forests and other forested areas resulting from enemy attack.

The USDA program of fire protection on wild and rural lands provides leadership and guidance to the States. It involves about 92 percent of the Nation's land area. In carrying out this program the Forest Service relies heavily on the cooperation of State and private agencies and other Federal agencies that have rural fire protection capability.

State civil defense organizations will

assist local fire-defense agencies in planning, organizing, equipping, and coordinating fire-defense activities.

Effectiveness of national and State fire-defense organizations depends on volunteers. These organizations can function more effectively if rural volunteer groups are trained and prepared. Individual preparations serve a dual purpose. For example: A fire lane around a farm forest or grain field protects the owner's property in peace and in time of emergency and also contributes to the local fire-defense effort.

In the American tradition, it is important that neighbors be prepared to help each other. Every farmer and rural resident should know (1) the basic rules of fire prevention, and how to apply them; (2) how to report fires; (3) how to extinguish small fires; and (4) how best to assist fire-protection organizations.

If you need fire-defense information, consult your State forester or local official in charge of rural fire defense, or consult the chairman of your county defense board.

MORE POINTERS ON PROTECTION

What you can do now . . .

- Build a family fallout shelter, or pick the safest place in or around your house and add protection to it. Maintain a 2-week emergency supply of food and water in or near your shelter or protection area. . . . Obtain a disaster first aid kit and store it in your protection area. . . . Obtain a battery radio. You may need an outside aerial to get adequate reception. Try it and see

. . . . Obtain a civil-defense-approved radiation-detection instrument.

- Plan an emergency water supply and a sewage disposal method for your home protection area. They should not depend on electric power since it might fail as a result of the attack.

If you have a few hours' warning . . .

- Make arrangements for the safety of your family and yourself.

- Confine all livestock, preferably to buildings, or at least in drylot.

- Bring feed into buildings, or cover it with tarpaulins if it is left outdoors.

- Store as much water as possible for livestock, especially if the water is coming from ponds or streams or through water mains. Cover wells, rainbarrels, and tanks.

If you have a few months' warning . . .

- Put your silage pits and haystacks near buildings and cover them with tarpaulins.

- Keep your well clean and covered. Put some rainwater barrels and other containers near buildings; fill them regularly with clean water and keep them covered.

- Store seed and grain in weather-proof buildings.

- Stock up on packaged, canned, and bottled foods.

- Have a satisfactory storage space for fuel, and maintain an emergency supply.

- Make sure that you have a place to confine livestock and poultry, preferably a place that has an overhead cover.

During and after fallout . . .

Even without specific warning from civil defense officials, you can tell if a serious fallout hazard exists in your area. Serious levels of fallout radiation will not occur without being accompanied by visible quantities of fallout material.

- If you can detect no dustlike fallout material on smooth surfaces such as automobiles, sidewalks, or window ledges, you may assume your area has been spared.

- Wash your face and hands and brush your clothing if you were outside when fallout was being deposited or if you go out into a dusty area afterwards.

- Food or water inside a closed area in a house or inside a shelter would not be contaminated. Uncovered food brought in from a contaminated area should be cleaned.

Milk—Should not be used for infants if the cattle producing it have grazed on contaminated pasture or their feed was highly contaminated.

Eggs—All right to use.

Potatoes and root crops—Normal cleaning is adequate.

Green vegetables—Wash carefully or remove outer layers if they have fallout material on them.

Peas and beans—Normal cleaning is adequate.

- Wash hands thoroughly before you eat.

- Wear protective clothing—hat, coat, boots, gloves—the first few days you work outdoors. If you are plowing or cultivating dry land, or if you are harvesting corn, wear a dust filter over your nose and mouth; even a handkerchief will be of some value.

The U.S. Department of Agriculture has produced two motion picture films on defense and radioactive fallout:

“Fallout and Agriculture” (16 mm., sound, color, 23 minutes).

“The Safest Place” (16 mm., sound, color, 12½ minutes).

These films are available for loan from the film library of your State land-grant college. For the address of the land-grant college in your State, write to Motion Picture Service, Office of Information, U.S. Department of Agriculture, Washington, D.C., 20250.
